

Genetic engineering of *Starmerella bombicola* for the production of cellobiose lipids

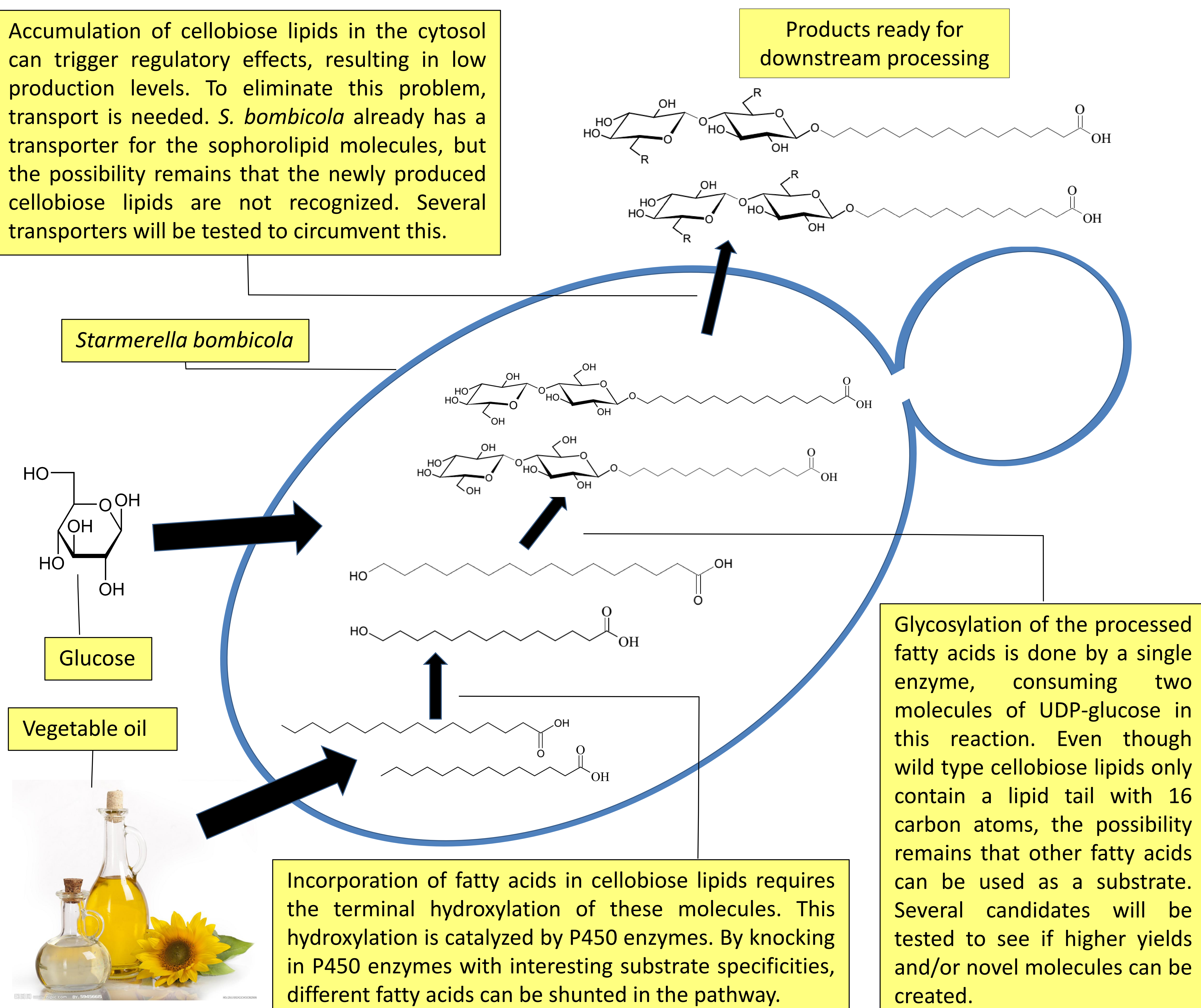
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Glycolipids are an interesting kind of biosurfactants. They have valuable properties like low toxicity, good biodegradability and excellent surface activity. Unfortunately, commercialization of these molecules has been hampered by low yields and low structural variety. Replacing the different wild type producers by a platform organism is a possible strategy to solve these problems. *Starmerella bombicola* is well known for the production of sophorolipids. Exceptional yields (400g/l) and high tolerance towards glycolipids make this yeast an interesting candidate. Attempts at engineering this organism to create a production platform for cellobiose lipids have been successful but further optimization is required.

Accumulation of cellobiose lipids in the cytosol can trigger regulatory effects, resulting in low production levels. To eliminate this problem, transport is needed. *S. bombicola* already has a transporter for the sophorolipid molecules, but the possibility remains that the newly produced cellobiose lipids are not recognized. Several transporters will be tested to circumvent this.

Products ready for
downstream processing



Combining the different genes can result in several interesting strains. Not only higher yields can be achieved, also new-to-nature cellobiose lipids with altered fatty acid tails are a possibility. For the moment, 4 strains with different combinations of transporters and glucosyltransferases have been created and are being tested for their production capacity by shake flask fermentations. During these and other experiments, several hydrophobic substrates will be tested as well to see whether or not they have an influence on the production levels or structural diversity of the molecules being produced. Interesting vegetable oils with high ratios of medium chain fatty acids like lauric, myristic and palmitic acid are coconut oil, palm kernel oil and palm oil. The knowledge gathered during this project can be used for further engineering of *S. bombicola* for the production of other tailor-made glycolipids.